Complete Summary

GUIDELINE TITLE

VA/DoD Clinical practice guideline for rehabilitation of lower limb amputation.

BIBLIOGRAPHIC SOURCE(S)

Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for rehabilitation of lower amputation. Washington (DC): Department of Veterans Affairs, Department of Defense; 2007. 163 p. [71 references]

GUIDELINE STATUS

This is the current release of the guideline.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- May 2, 2007, Antidepressant drugs: Update to the existing black box warning on the prescribing information on all antidepressant medications to include warnings about the increased risks of suicidal thinking and behavior in young adults ages 18 to 24 years old during the first one to two months of treatment.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

- Conditions necessitating lower extremity amputation, including traumatic (combat or non-combat-related) or non-traumatic (dysvascular, neuropathy, carcinoma, or infection) causes
- Complications of lower extremity amputation (bilateral and unilateral) including through-hip, transfemoral, through-knee, transtibial, through-ankle, and partial foot

GUIDELINE CATEGORY

Evaluation
Management
Prevention
Rehabilitation
Treatment

CLINICAL SPECIALTY

Internal Medicine
Physical Medicine and Rehabilitation
Surgery

INTENDED USERS

Advanced Practice Nurses
Dietitians
Nurses
Occupational Therapists
Physical Therapists
Physician Assistants
Physicians
Psychologists/Non-physician Behavioral Health Clinicians
Social Workers

GUIDELINE OBJECTIVE(S)

- To address the key principles of rehabilitation and streamline the care for the patient with amputation who will eventually transition from a Department of Defense (DoD) to a Veterans Affairs (VA) facility
- To describe the critical decision points in management of rehabilitation of lower-limb amputation
- To provide a clear and comprehensive guideline incorporating current information and practices for practitioners throughout the DoD and Veterans Health Administration systems
- To improve local management of patients with lower-limb amputation

TARGET POPULATION

Adults with a lower extremity amputation (bilateral and unilateral) including through-hip, transfemoral, through-knee, transtibial, through-ankle, and partial foot, who are eligible for care in the Veterans Affairs (VA) or Department of Defense (DoD) health care delivery system. The cause of the amputation may be traumatic (combat or non-combat-related) or non-traumatic (dysvascular, neuropathy, carcinoma, or infection).

Note: Patients with polytrauma, including head injuries, who require a lower limb amputation are not included in the target population.

INTERVENTIONS AND PRACTICES CONSIDERED

Interventions in each rehabilitation phase (preoperative, acute postoperative, pre-prosthetic, prosthetic training, long-term follow-up) of lower extremity amputation:

1. Pain management
2. Medical comorbidity management (nutritional, cardiovascular, endocrine, neurologic, bowel and bladder, skin, musculoskeletal, infectious, and neuropsychiatric impairments)
3. Behavioral health (psychological and cognitive function)
4. Residual limb management
5. Patient education
6. Prosthetic prescription, fitting, fabrication, and training
7. Discharge planning
8. Rehabilitation interventions
    - Range of motion
    - Strengthening
    - Cardiovascular
    - Balance
    - Mobility
    - Home exercise program
9. Functional activities and activities of daily living (ADLs)
10. Community integration
    - Vocation and recreation
    - Home evaluation
    - Driver's training
11. Providing appropriate medical equipment

MAJOR OUTCOMES CONSIDERED

- Function
- Health-related quality of life (HRQOL)
- Pain

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Formulating of Questions

The Working Group developed researchable questions and associated key terms after orientation to the scope of the guideline and to goals that had been identified by the Working Group. The questions specified (adapted from the Evidence-Based Medicine [EBM] toolbox, Center for Evidence-Based Medicine, (http://www.cebm.net):

- **P**opulation – Characteristics of the target patient population
- **I**ntervention – Exposure, diagnostic, or prognosis
- **C**omparison – Intervention, exposure, or control used for comparison
- **O**utcome – Outcomes of interest

These specifications served as the preliminary criteria for selecting studies. Research questions focused on the following areas of inquiry: pain control, postoperative dressing, behavioral health and support, effect of co-morbidity and rehabilitation interventions and outcomes.

Selection of Evidence

The evidence selection was designed to identify the best available evidence to address each key question and ensured maximum coverage of studies at the top of the hierarchy of study types. Evidence-based guidelines, meta-analyses, systematic reviews of published, peer-reviewed randomized trials and single randomized controlled trials were considered to constitute the strongest level of evidence in support of guideline recommendations. This decision was based on the judgment that randomized controlled trials (RCTs) provide the clearest, scientifically sound basis for judging comparative efficacy. The Working Group made this decision recognizing the limitations of RCTs, particularly considerations of generalizability with respect to patient selection and treatment quality. When available, the search sought out critical appraisals already performed by others that described explicit criteria for deciding what evidence was selected and how it was determined to be valid. The sources that have already undergone rigorous critical appraisal include Cochrane Reviews, Best Evidence, Technology Assessment, and evidence-based practice center (EPC) reports.

The search was performed using the National Library of Medicine's (NLM) Medline database. The terms "amputation," "traumatic amputation," and "limb-loss" were used together with the following Boolean expressions and terms:

- Pain control
- Outcome
- Rehabilitation
- Behavior therapy

In addition to Medline/PubMed, the following databases were searched: Database of Abstracts of Reviews of Effectiveness (DARE) and Cochrane Central Register of Controlled Trials (CCTR). For Medline/PubMed searches, limits were set for

language (English), date of publication (1996 through 2006) and type of research (RCT, systematic reviews, and meta-analysis).

As a result of the literature reviews, articles were identified for possible inclusion. These articles formed the basis for formulating the guideline recommendations. The following inclusion criteria were used for selecting randomized controlled trial studies:

- Articles published between 1996 and 2006
- English language only
- Full articles only
- Age limited to adults greater than 18 years
- Randomized controlled trials or prospective studies
- Focus on amputation or traumatic amputation of lower extremities
- Key outcomes cited (function, health related quality of life [HRQOL], pain)

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Quality of Evidence (QE)

I	At least one properly done randomized controlled trial (RCT)
II-1	Well designed controlled trail without randomization
II-2	Well designed cohort or case-control analytic study, preferably from more than one source
II-3	Multiple time series evidence with/without intervention, dramatic results of uncontrolled experiment
III	Opinion of respected authorities, descriptive studies, case reports, and expert committees

Overall Quality

Good	High grade evidence (I or II-1) directly linked to health outcome
Fair	High grade evidence (I or II-1) linked to intermediate outcome; *or* Moderate grade evidence (II-2 or II-3) directly linked to health outcome
Poor	Level III evidence or no linkage of evidence to health outcome

Net Effect of the Intervention

Substantial:	More than a small relative impact on a frequent condition with a substantial burden of suffering; *or* A large impact on an infrequent condition with a significant impact on the individual patient level.
Moderate:	A small relative impact on a frequent condition with a substantial burden of suffering; *or* A moderate impact on an infrequent condition with a significant impact on the individual patient level.
Small:	A negligible relative impact on a frequent condition with a substantial burden of suffering; *or* A small impact on an infrequent condition with a significant impact on the individual patient level.
Zero or Negative:	Negative impact on patients; *or* No relative impact on either a frequent condition with a substantial burden of suffering, *or* an infrequent condition with a significant impact on the individual patient level.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Preparation of Evidence Tables (Reports) and Evidence Rating

The results of the search were organized and evidence reports were prepared. Copies of the original studies were provided to the Working Group upon request. Each reference was appraised for scientific merit, clinical relevance, and applicability to the populations served by the Federal health care system. Recommendations were based on consensus of expert opinions and clinical experience only when scientific evidence was unavailable.

A group of research analysts read and coded each article that met inclusion criteria. The articles have been assessed for methodological rigor and clinical importance using the following criteria:

The information was synthesized and reported in a brief summary of the critical appraisal of each article that included the following components:

- Description of patient population
- Interventions
- Comparisons
- Outcomes
- Summary of results
- Analysis of findings
- Evidence appraisal
- Clinical significance

Quality of evidence ratings were assigned for each source of evidence using the grading scale presented in "Rating Scheme for the Strength of the Evidence" in this summary.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The development process of this guideline follows a systematic approach described in "Guideline for Guidelines," an internal working document of Veteran Health Administration's (VHA's) National Clinical Practice Guideline Counsel, which requires an ongoing review of the work in progress. The Working Group of the VHA/Department of Defense (DoD) was charged to provide evidence-based action recommendations whenever possible.

Development Process

The Offices of Quality and Performance and Patient Care Services, in collaboration with the network Clinical Managers, the Deputy Assistant Under Secretary for Health, and the Medical Center Command of the DoD identified clinical leaders to champion the guideline development process. During a preplanning conference call, the clinical leaders defined the scope of the guideline and identified a group of clinical experts from the Veterans Affairs (VA) and DoD that formed the Rehabilitation of Lower Limb Amputation Working Group. Working Group members included representatives of the following specialties: physical medicine, surgery, physical and occupational therapy, psychology, vocational rehabilitation, prosthetics, nursing, pharmacy, and health care systems management and policy. Working Group members also received input from several clinical directors of amputation clinics in the VHA and DoD.

As a first step, the guideline development groups defined a set of clinical questions within the area of the guideline. This ensured that the guideline development work outside the meeting focused on issues that practitioners considered important and produced criteria for the search and the protocol for systematic review and, where appropriate, meta-analysis.

The Working Group participated in an initial face-to-face meeting to reach consensus about the guideline algorithm and recommendations and to prepare a draft document. The draft continued to be revised by the Working Group at-large through multiple conference calls and individual contributions to the document. Following the initial effort, an editorial panel of the Working Group convened to further edit the draft document.

Experts from the VA and DoD in the areas of physical medicine and rehabilitation in particular reviewed the final draft and their feedback was integrated into the final draft document.

This Guideline is the product of many months of diligent effort and consensus building among knowledgeable individuals from the VA, DoD, academia, as well as guideline facilitators from the private sector. An experienced moderator facilitated the multidisciplinary Working Group. The list of participants is included in Appendix G of the original guideline document.

Lack of Evidence – Consensus of Experts

Very few source documents that use an evidence-based approach were found in the searches. Therefore, while the Working Group utilized evidence-based sources wherever applicable, most of the recommendations in this guideline emerged through a discussion and consensus process.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

	Net Benefit of the Intervention

Quality of Evidence	Substantial	Moderate	Small	Zero or Negative
Good	A	B	C	D
Fair	B	B	C	D
Poor	I	I	I	I

Strength of Recommendation Rating System	
A	A strong recommendation that the clinicians provide the intervention to eligible patients. *Good evidence was found that the intervention improves important health outcomes and concludes that benefits substantially outweigh harm.*
B	A recommendation that clinicians provide (the service) to eligible patients. *At least fair evidence was found that the intervention improves health outcomes and concludes that benefits outweigh harm.*
C	No recommendation for or against the routine provision of the intervention is made. *At least fair evidence was found that the intervention can improve health outcomes, but concludes that the balance of benefits and harms is too close to justify a general recommendation.*

Strength of Recommendation Rating System	
D	Recommendation is made against routinely providing the intervention to asymptomatic patients. *At least fair evidence was found that the intervention is ineffective or that harms outweigh benefits.*
I	The conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention. *Evidence that the intervention is effective is lacking, or poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

COST ANALYSIS

Guideline developers reviewed published cost analyses in the preparation of the guideline.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The final draft document was reviewed by a diverse group of experts and by independent peer reviewers, whose input was also considered. The final document was submitted for review and approval by the Veterans Affairs/Department of Defense Evidence-Based Practice Working Group.

Survey of Current Practice

A survey was prepared and disseminated to practicing professionals within both the VA and DoD who work directly with patients who have had lower limb amputations. An effort was made to reach a maximum number of individuals from the various disciplines that provide care and services to this population. These professional staff members were queried as to care in all phases of rehabilitation of patients with amputation. In addition, they were asked to share testing techniques and approaches that they have found to be especially successful in

working with patients with lower limb amputations. The results of the survey were kept from the Working Group to avoid creating bias and were compared to the final list of recommendations that emerged from the group discussion. The summary table (Table 2 of the original guideline document. Summary of Interventions in Rehabilitation Phases) was compared and consolidated with the results of the survey).

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The recommendations for the rehabilitation of lower limb amputation are organized into 6 major modules (a Core Module that cuts across all phases and Modules A-E that correspond to the individual phases of care). The algorithms, action statements, and recommendations that accompany each module and the evidence supporting the recommendations are presented below. The quality of evidence **(QE)** grading (I-III); overall quality (**Good, Fair, Poor**); and final grade of recommendations **(R)** (A-D, I) are provided for specific statements. These grades, along with "net effect of the interventions" are defined at the end of the "Major Recommendations" field.

Note: A list of all abbreviations is provided at the end of the "Major Recommendations" field.

CORE Module

CORE-1. Interdisciplinary Consultation/Assessment

Action Statement

Interdisciplinary team assessment and management should be employed in the care of all patients with amputations throughout all phases of care.

Recommendations

1. Key disciplines to be consulted during the preoperative (when possible) and postoperative phases of rehabilitation care include physiatry, surgery, physical therapy, occupational therapy, prosthetics, social work services, case management, mental health, nursing, nutrition, and recreation therapy. In addition, the following specialties should be available on a case-by-case basis: vascular surgery, plastic surgery, internal medicine, pain management, vocational therapy, and spiritual advisors.
2. The patient and family members (or other caregivers) should be an integral part of the interdisciplinary rehabilitation team.
3. Interdisciplinary rehabilitation team meetings should be conducted on a regular basis within the institution to facilitate communication and integration of a comprehensive treatment plan.
4. Outpatient amputation clinics should have interdisciplinary team participation for the periodic assessment of patients to ensure appropriate life-long care in order to preserve the quality of life, achievement of maximum function, and reduction of secondary complications.

CORE-2. Rehabilitation Treatment Plan

Action Statement

A comprehensive, interdisciplinary, patient-centered treatment plan should be developed early in the course of the rehabilitation process, and updated and modified throughout all phases of care.

Recommendations

1. Evaluations from all key team members should be included in the development of the treatment plan.
2. The treatment plan must address identified rehabilitation, medical, mental health, and surgical problems.
3. The treatment plan should identify realistic treatment goals.
4. The treatment plan should identify and address plans for discharge at the initiation of the rehabilitation process. The discharge treatment plan should include needs for specialized equipment, evaluation of and required modifications of the discharge environment, needs for home assistance, and an evaluation of the patient's ability to drive (see CORE-9: Social Environment).
5. The initial treatment plan should be established early in the rehabilitation process and updated frequently based on patient progress, emerging needs, or problems.
6. The treatment plan should indicate the anticipated next phase of rehabilitation care.

CORE-3. Pain Management

Action Statement

Pain assessment and treatment using pharmacological and non-pharmacological means for pain control should start in the preoperative phase and continue throughout the rehabilitation and prosthetic training.

Recommendations

1. Pain should be assessed at all phases of rehabilitation, preferably with a tool specific to pain assessment in patients with lower limb amputations. [**Expert Opinion**]
2. When assessing pain, standardized tools should be used. Examples include; Visual Analogue Scale (VAS), Short Form McGill Pain Questionnaire (SF-MPQ), and Pain Interference Scale (PIS). [**B**]
3. When possible, a postoperative treatment plan for pain control should be developed before surgery and be based on the preoperative pain assessment and treatment initiated. [**I**]
4. Measurement of the intensity of pain should be separately assessed at each site (i.e., phantom limb pain [PLP], residual limb pain [RLP], low back pain [LBP]) to achieve a thorough assessment of pain-related impairment. [**B**]
5. Prophylactic pain management should be considered prior to initiation of physical rehabilitation intervention. [**I**]

6. Narcotic analgesics should be considered in the immediate postoperative phase. [**Expert Opinion**]
7. Transition to a non-narcotic pharmacological regimen combined with physical, psychological, and mechanical modalities should be considered throughout the rehabilitation process. Treatment should target pain related to the residual/phantom limb and address pain in other body parts from a primary care approach. [**C**]
8. There is no consistent evidence to support or refute one specific type of pain control. Available modalities include: [**I**]
    a. Pharmacological: anti-seizure medications (e.g., gabapentin), tricyclic antidepressants (TCA), selective serotonin re-uptake inhibitors (SSRI), non-steroidal anti-inflammatory drugs (NSAID), dextromethorathane, and long-acting narcotics
    b. Epidural analgesia, use of patient controlled analgesia (PCA), or regional analgesia may be considered, although the benefit is unproven
    c. Non-pharmacological: transcutaneous electrical nerve stimulation (TENS), desensitization, scar mobilization, relaxation, and biofeedback.

    (See the VA/DoD Clinical Practice Guideline for the Management of Acute Postoperative Pain [available at the Department of Veterans Affairs Web site])

CORE-4. Medical Care

Action Statement

Comprehensive medical assessment and the management of individuals undergoing amputation are imperative throughout the continuum of care. Optimizing medical, surgical, and rehabilitation outcomes requires a holistic approach to patient care.

Recommendations

1. **Medical status** including laboratory studies should be assessed and monitored as indicated to screen for infection, anemia, electrolyte imbalances, nutrition, and liver and kidney diseases.
2. The comprehensive medical care throughout the phases of rehabilitation of patient with amputation should address:
    a. Cardiac and pulmonary function
    b. Assessment and monitoring for infection using laboratory and radiographic studies
    c. Assessment and management of diabetes and its complications to improve outcome and reduce the risk for complication and further amputation
    d. Assessment and management of peripheral vascular diseases to improve outcome and prevent complications such as claudication and residual limb ischemia
    e. Prevention of secondary complications such as venous thrombosis, embolism, heterotopic bone formation, contracture, and decubitus ulcers is necessary
    f. Attention to bone health.

3. Modifiable health risk factors should be assessed, and education and treatment strategies to reduce their impact on morbidity and mortality should be implemented (e.g., smoking cessation, body weight management, diabetes management, hypertension control, substance abuse).
4. In special populations, such as traumatic amputation, upper motor neuron lesions, and burns, the risk of heterotopic ossification (HO) should be recognized. Appropriate intervention for prevention of HO includes radiation, nonsteroidal medications, and bisphosphonate medications.

CORE-5. Cognitive Assessment

Action Statement

A cognitive/neuropsychological assessment should be conducted prior to the operation, if possible, to assist in the process of determining the patient's ability to learn, adapt to, and utilize a prosthesis following surgery as well as the long-term abilities for autonomous and independent living. The assessment may be repeated after the surgery if indicated by the patient's function or the response to treatment.

Recommendations

1. A cognitive battery of testing should include:
    a. Intellectual functioning and attention/concentration along with working memory and speed of processing
    b. Executive functioning
    c. Learning and memory: short- and long-term, auditory and visual, recall, and recognition
    d. Self (and possibly family) reported cognition and emotional functioning

2. Testing should be conducted by appropriately trained and certified individuals.
3. Evaluations should include standardized tests, self-reporting, behavioral descriptions and subjective estimations from family and others, careful history taking, recognition of other possible comorbid factors (e.g., depression, dementia), and acknowledgment of the limitations and sources of variability and error in measuring psychometric performance.
4. Neuropsychological referrals should be specific and guided by preliminary mental status assessment by the rehabilitation team. Neuropsychological assessments should focus on the referring question and not provide specific medical advice.

CORE-6. The Residual Limb

Action Statement

The residual limb should be appropriately managed to prepare for prosthetic training and to enhance functional outcomes.

Recommendations

1. Limb volume management is a critical issue throughout the lifespan of the individual.
    a. Apply an external compressive device to optimize the limb volume (postoperative rigid dressing, ACE wrap, shrinker, liner).
    b. Optimize overall fluid management by controlling congestive heart failure, renal failure, or dialysis treatments.
    c. Encourage the patient to maintain a stable body weight.
    d. Encourage the patient to wear an external compressive device when the prosthesis is not worn, especially during the early postoperative and prosthetic phases.
    e. Discourage dependent positioning of the residual limb in a wheelchair.

2. The patient should be educated about care and management of the residual limb including:
    a. Proper application of external compressive devices (ACE wrap, shrinker)
    b. Proper donning and doffing technique for the prosthesis
    c. Adjustment of prosthetic sock ply for limb volume change, if appropriate
    d. Proper hygiene of the residual limb and prosthesis
    e. Daily inspection of the residual limb for signs of abnormal pressure distribution
    f. Training with a long handled mirror to assist in the inspection of the residual limb.

3. Interventions to prevent contracture at both the hip and the knee should be considered on an ongoing basis, especially in the early postoperative period and when the patient is an intermittent or marginal ambulator.
    a. Rigid dressing and knee immobilizers may be considered for the patient with a transtibial amputation to prevent knee flexion contractures. A number of early postoperative dressing strategies help to maintain range of motion of the knee.
    b. Initiate exercise programs to strengthen the quadriceps and gluteal muscles, along with active and passive range of motion exercises.
    c. Initiate proper positioning and begin a prone lying program. Do not place pillows under the knee to increase comfort as it increases the chance of contractures forming.
    d. Encourage ambulation and weight bearing through the prosthesis.

4. Bony overgrowth may become painful at any stage of its growth and cause significant pain and limitations in prosthetic fittings.
    a. Use preventive measures where necessary in a high-risk population (radiation, bisphosphonates, NSAIDs).
    b. Due to reductions in soft tissue volume, the relative prominence of bony overgrowth may increase, resulting in the need for prosthetic modifications or replacement.
    c. Associated pain may be treated with prosthetic modifications and/or local injections.
    d. Surgical excision and possible limb revision is a last resort.

5. Limb protection should be emphasized especially during the early phases when the risk of falls is greater.

a. The patient should be instructed to wear an external protective device on the residual limb.
b. An external protective device may include a postoperative rigid dressing or a prefabricated rigid dressing.

6. Skin and soft tissue should be monitored on a regular basis to detect any mechanical skin injury related to abnormal pressure distribution or signs and symptoms of infection.
    a. Abnormal pressure distribution should be prevented by ensuring that the prosthesis is properly aligned and the prosthetic socket fit is adequate and it should be modified as needed.
    b. Superficial infection (fungal, folliculitis, cellulitis), or deep infection (osteomyelitis) should be treated early and aggressively to prevent deterioration of the residual limb condition that will have serious impact on the functional mobility of the patient.

7. Patients should be advised that a stable body weight is critical to long-term success.

CORE-7. The Contralateral Limb

Action Statement

Comprehensive evaluation of the neurological, musculoskeletal, soft tissue, and vascular status of the contralateral limb is necessary to initiate educational programs and establish specialized footwear or orthotic needs.

Recommendations

1. Comprehensive assessment of the contralateral limb should include:
    a. Evaluating for the presence and severity of a sensory deficit
    b. Quantifying the presence and extent of a motor deficit
    c. Determining the arterial perfusion status of the extremity
    d. Evaluating the presence of deformity
    e. Evaluating for signs of acute or chronic abnormal pressure loading, including tissue redness, ulceration or callosity
    f. Inspecting the patient's footwear, including wear pattern

2. The patient and/or caregiver should be educated about strategies to protect the skin integrity of the foot (see Appendix D in the original guideline document).
3. Appropriate foot care as indicated should provide:
    a. Local foot care for callosities and nail care management by a health professional, especially in the context of sensory impairment or poor vision
    b. Footwear that can be adapted to meet a patient's mobility needs, and that can accommodate a foot deformity and/or an orthotic device
    c. Orthoses to optimize the pressure distribution on the foot or to substitute for muscle weakness or spasticity

4. Regular follow-up to evaluate the adequacy of the footwear or orthosis should be established.
5. Specialized foot protection devices and/or mattresses should be considered for patients that are confined to bed or spend a considerable amount of time in the recumbent position.

CORE-8. Behavioral Health Assessment and Treatment

Action Statement

Complete a psychological assessment in the preoperative phase, if possible. Evaluate the psychosocial status and treat problems throughout all phases of rehabilitation.

Recommendations

1. Psychosocial functioning should be assessed at each phase of amputation management and rehabilitation. Assessment should focus on current and past symptoms of psychopathology, particularly depression, anxiety, and posttraumatic stress symptoms. [**B**]
2. Interventions need to focus particularly on depressive, anxiety, and posttraumatic stress disorder (PTSD) symptoms, using empirically supported medical and psychotherapeutic treatments for depression and PTSD. [**B**] Refer to the VA/DoD Clinical Practice Guidelines on Major Depressive Disorder in Adults and Post-Traumatic Stress Disorder (available at the Department of Veterans Affairs Web site) for management of these common problems.
3. Effective coping goals/strategies should be developed during psychotherapeutic or counseling interventions. [**B**]
4. During the assessment, examples of effective and ineffective coping strategies should be discussed with the patient, such as enlisting sufficient social support versus social withdrawal and disengagement and problem solving difficulties versus helplessness and passivity. [**B**]
5. Specific structured interventions for problems such as depression, anxiety, sexual difficulties, substance abuse or drug overuse, and pain should be considered. [**B**]
6. Interventions may operate through individual, couple, family, or group therapy modalities. [**B**]
7. Significant others should be included in psychotherapeutic and/or psychoeducational interventions as needed. [**B**]
8. The use of validated tools for assessment should be considered; some examples may include:
    a. Prosthesis Evaluation Questionnaire (PEQ) for psychometric assessment is a self-report questionnaire comprising 10 sub-scales: 4 prosthetic function scales, 2 mobility scales, 3 psychosocial scales, and 1 well-being scale.
    b. Trinity Amputation and Prosthetic Experience Scales (TAPES) for psychosocial evaluation is also a self-report quality of life questionnaire with nine sub-scales; 3 psychosocial scales, 3 activity restriction scales, and 3 satisfaction subscales. TAPES has the advantage of being able to predict residual limb pain, phantom limb pain, and the extent of prosthetic use.

c. The Hospital Anxiety and Depression Scale (HAD) is a 14-item highly sensitive brief screening for anxiety and depression, commonly used in hospital settings.
d. The SF-36 Health Survey measures the degree of burden or dysfunction a medical condition has in a patient's life.

9. Psychological components to multidisciplinary approaches to chronic pain management should be included as needed. [**B**]

CORE-9. Social Environment (Support)

Action Statement

Identify the social and physical support system that will be available to the patient during the rehabilitation process and help cope with the challenges of limb loss.

Recommendations

1. A baseline assessment should be obtained and continuously updated throughout the rehabilitation phases. The assessment should include information about the existing social environment and support system:

   Interpersonal Social Environment

   a. Family and extended family
   b. Community - including workplace, employers/employees and co-workers
   c. Spiritual, religious, and cultural support
   d. Peer support system (see Core-10: Peer Support Interventions)

   Physical Environment

   e. Home environment – hazards and need for modification to address safety and accessibility
   f. Workplace
   g. Community – geographical location, distance from resources and services, and access to resources

   Economic Environment

   h. Sources of income and/or financial support.

CORE-10. Peer Support Interventions

Action Statement

Peer support should be considered, if available, throughout the course of amputation and rehabilitation.

Recommendations

1. Peer visitation strategies may be considered throughout the rehabilitation cycle, particularly early when anxiety and adjustment problems may be most pronounced. [**C**]
2. Peer support interventions may be a particularly useful aspect of pre-procedural patient education interventions. [**C**]
3. Peer visitation volunteers should receive structured training prior to performing peer visitation services. The Amputee Coalition of America (ACA) provides a reputable training certification program. [**C**]
4. Patients should be referred to peer support groups or similar resources, if available. [**I**]

CORE-11. Patient Education

Action Statement

Patients scheduled for amputation should receive in-depth education regarding the procedure itself, and the various components of postoperative care and rehabilitation activities that will occur. A combination of information-giving and coping skills training should continue through all phases of the rehabilitation care.

Recommendations

1. Pre-procedural educational interventions should be provided to the patient before amputation, if possible, in order to decrease his/her fear, anxiety, and distress and to improve his/her post-procedural recovery. [**B**]
2. All members of the rehabilitation team should be involved in patient education as part of their interaction with the patient. [**C**]
3. Pre-procedural educational interventions should generally include information and a description of the specific procedures and events the patient will experience at the various phases of treatments, and continue throughout the continuum of care. [**B**]
4. Educational interventions should also include sensory information, that is a description of sensations and other feelings/symptoms the patient may experience at various stages during and following the procedure. [**B**]
5. Educational interventions may also include coping skills training; cognitive behavioral coping strategies are likely to be the most effective strategies. [**B**]
6. General supportive counseling (e.g., eliciting and validating the patient's anxieties, fears, and concerns) may also be helpful. Open-ended questioning, active listening techniques, eliciting anticipation of future stressors, and eliciting and encouraging utilization of the patient's social support resources are important strategies irrespective of whether information-giving or coping skills training interventions are being used. [**C**]

CORE-12. Learning Assessment

Action Statement

Obtain a learning assessment of the patient and family.

Recommendations

1. Prior to the learning assessment, the health professional should assess the patient with a lower limb amputation for core concerns, potential fears, support limitations, and cultural history.
2. The best time to begin a learning assessment is determined on a case-by-case basis but often begins with the initial contact with the patient who has had a lower limb amputation and their family.
3. The learning assessment should use open-ended questions to obtain the following and additional, information:
    a. Patient/family's ability to cope with the health status, plan of care, prognosis, and outcome
    b. Patient/family needs, concerns, roles, and responsibilities
    c. Specific learning needs (knowledge, attitudes, skills) and educational level
    d. Barriers to learning, including physical and/or cognitive limitations, language, emotional or psychological, and financial difficulties
    e. Readiness to learn
    f. Patient preferences regarding learning methods

CORE-13. Physical Rehabilitation

CORE-13.1 Range of Motion

Action Statement

Continuously monitor and maximize the range of motion to enhance postoperative outcomes.

Recommendations

1. The residual limb should always be properly positioned to avoid contractures that could interfere with future prosthetic fit and ambulation. In a transtibial amputation, the residual limb should be placed in knee extension when in bed. For a transfemoral or transtibial amputation, the residual limb should be kept in neutral alignment for adduction/abduction and internal/external rotation. At no time should a pillow be placed under the residual limb.
2. A prone lying program should be initiated with all patients who have a lower extremity amputation to avoid hip flexion contractures. Progressively advance the length of time from the patient's tolerance to 30 minutes twice per day if possible.

(See Table 2, Summary of Interventions in Rehabilitation Phases, in the original guideline document for detailed interventions by phases of care.)

CORE-13.2 Strengthening

Action Statement

Throughout the continuum of care, assess and improve the strength of all muscle groups that impact use of a prosthesis and overall functional capacity.

Recommendations

1. A strengthening program should be initiated for the major muscle groups of the upper extremities, trunk, and the residual and contralateral limbs in order to maximize functional use of the prosthesis and prevent the development of comorbidities such as low back pain.
2. Both open and closed-chain exercises and isokinetic and progressive resistance exercises should be included in the strengthening program.
3. Specific muscle groups to strengthen include hip extensors, hip adductors, hip abductors, abdominal musculature, back musculature, knee extensors, rotator cuff, and elbow extension.
4. A home exercise program should be designed and tailored to a patient's individual needs for use on a long-term basis.

CORE-13.3 Cardiovascular Fitness and Endurance

Action Statement

Increase cardiovascular fitness and endurance to maximize the efficiency of gait, both with or without a prosthesis.

Recommendations

1. A tailored cardiovascular training program should be initiated as soon as possible in the postoperative phase and continue throughout the rehabilitation process.
2. The cardiovascular program should include upper body ergometry regardless of the ability to use a lower extremity prosthesis.
3. Gait training should progress from use of an appropriate assistive device and increase to community distances as cardiovascular fitness improves.
4. Consultation to a cardiac rehabilitation program should be considered, particularly in patients with known cardiopulmonary disease or dysvascular amputation.
5. Higher level sporting activities should be pursued to supplement routine cardiovascular fitness in younger individuals with traumatic amputation.

CORE-13.4 Balance

Action Statement

Initiate, measure, and adjust a balance re-training program to minimize a patient's risk of falling and increase the efficiency of gait, both with and without a prosthesis.

Recommendations

1. Sitting and standing balance should be assessed throughout the rehabilitation process using standardized assessment tools such as the Berg or Tinetti Balance Assessment.
2. Interventions should start with sitting balance and progress to sitting weight shifts, then sit to stand, supported standing, single-limb balance, and dynamic balance training.

3. Balance should be challenged with a variety of activities such as weight shifting on a soft surface, rocker board, ball rolling under the sound foot, and step-ups.

CORE-14. Functional Rehabilitation

CORE-14.1 Functional Activities of Daily Living

Action Statement

Interventions to improve functional activities of daily living (ADL) should be initiated, measured and adjusted as needed during the postoperative phases.

Recommendations

1. The self-care component of functional ADL should include dressing, feeding, grooming, bathing, and toileting, with and without a prosthesis.
2. The transfers component of functional ADL should include the following, with and without a prosthesis:
    a. Sit to stand
    b. Bed to chair
    c. Chair to toilet
    d. Chair to tub
    e. Vehicle transfers
    f. Floor transfers

3. Patients should be educated in strategies to prevent falls and improve safety.

CORE-14.2 Mobility and Equipment

Action Statement

Initiate mobility training to optimize the patient's ability to move from one location to another by means of adaptive equipment, assistive devices, and vehicle modifications.

Recommendations

1. Standardized measures of mobility can assist with outcome measurement and determine additional social support and equipment needs. Consider utilizing one or more of the following measures, but note that they may not be helpful in the young active individual with traumatic amputation (see Table 8, Advantages and Disadvantages of Recommended Assessment Tools, in the original guideline document):
    a. Amputee Mobility Predictor (AMP)
    b. Functional Independence Measure (FIM)
    c. Two-Minute Walk Test
    d. Timed Up and Go Test (TUG)
    e. Upper Extremity Ergometry

2. The training program to improve mobility should include both the physical components of strengthening and cardiovascular fitness and practicing the actual activity.
3. Assistive devices (e.g., combination of canes, crutches, walkers, and manual and/or powered mobility) that the patient has demonstrated to be able to use safely and which improve the ability to navigate different environments should be prescribed.
4. A wheelchair should be prescribed for individuals with amputations who may experience times when they cannot use their prosthesis(es) and/or assistive devices for mobility.
5. Advanced wheelchair mobility skills should be taught to navigate such environments such as stairs, escalators, curbs, uneven terrain, and soft surfaces (grass, sand, gravel).
6. Vehicle modifications should be prescribed for those who cannot safely drive a vehicle due to right lower limb amputation, or left lower limb amputation with comorbidities to the right lower limb, or any individual with bilateral lower extremity amputations.

CORE-14.3 Community Reintegration

Action Statement

Establish goals for community reintegration and initiate, measure, and adjust interventions such as driver's training and vocational rehabilitation during the postoperative phases.

Recommendations

1. Training in the use of public transportation, with and without a prosthesis, should be provided, if appropriate.
2. Endurance should be increased with ambulation to community distances if appropriate.
3. Information on organizations with opportunities for adaptive recreational activities should be provided.
4. Driver's training and vehicle modifications should be pursued, if not already done. Any patient with a right lower extremity amputation should be evaluated and trained on a left foot accelerator. A patient with bilateral lower extremities amputation should be evaluated and trained in hand controls.
5. The patient's home should be evaluated for accessibility and information on home modifications should be provided.
6. Patient's worksite should be evaluated for the potential need for accommodations to facilitate return to the work setting.
7. Patients should be provided with a list of resources for information regarding amputations, support groups, and accessibility for people with disabilities.

Module A: Preoperative Assessment and Management

Preoperative Assessment and Management Algorithm

A-1. Clinical Decision to Perform Amputation

Action Statement

Every care should be taken to assure that the amputation is done only when clinically indicated.

Recommendation

1. Amputation should only be considered if the limb is non-viable (gangrenous or grossly ischemic), dangerous (malignancy or infection), or non-functional.

A-2. Is This an Urgent Need for Amputation (Trauma or Infection)?

Action Statement

Assess the degree of urgency in order to put the appropriate steps in motion to optimize the patient's outcome.

Recommendation

1. Consider urgent surgery in severe life-threatening situations including infection and trauma.

A-3. Preoperative Assessment

Action Statement

Obtain a comprehensive interdisciplinary baseline assessment of the patient's status.

Recommendations

1. A thorough medical assessment should be completed preoperatively to evaluate the patient's physical condition, nutrition, infection, neuropsychiatric impairment, and bowel and bladder function as well as a review of systems (cardiovascular, respiratory, endocrine, skin, neurological, and musculoskeletal).
2. Condition and function of the contralateral limb should be assessed including (see CORE-7: Contralateral Limb):
    a. Quantify the severity of the sensory deficit
    b. Observe for the presence of deformity
    c. Observe for signs of abnormal soft tissue loading
    d. Limb perfusion
    e. Education, specialized heel protectors, or specialized mattresses should be used to assure that the patient does not develop ulceration on the remaining limb.

3. Baseline function should be evaluated prior to amputation surgery (see CORE-13: Physical Rehabilitation and CORE-14: Functional Rehabilitation):
    a. Range of motion (ROM)
    b. Strength
    c. Exercise endurance

    d. Balance
    e. Mobility
    f. Activities of daily living (ADL)

4. Pain control measures should be initiated in the preoperative period to optimize the postoperative rehabilitation (see CORE-3: Pain Management).
5. A psychological assessment and preparation strategies should be completed in the preoperative phase whenever possible (see CORE-8: Behavioral Health Assessment and Treatment).
6. A preoperative cognitive assessment should be conducted to assist in the process of determining the patient's ability to learn, adapt to, and utilize a prosthesis following surgery as well as the ability to participate in rehabilitation and to maximize functional independence and community reintegration (see CORE-5: Cognitive Assessment).
7. Patient's goals and priorities should be assessed prior to amputation surgery.
8. Assess patient's social environment, home and community environments, and support system (see CORE-9: Social Environment).

A-4. Develop the Treatment Plan

Action Statement

Initiate appropriate rehabilitation to maintain function and prevent secondary complications.

Recommendation

1. A unified, cohesive, and comprehensive treatment plan should be developed prior to surgery that includes specific interventions for treatment by the interdisciplinary rehabilitation team members and updated throughout the full continuum of care.

    (See CORE 2: Rehabilitation Treatment Plan.)

A-5. Optimize Medical Status Prior to Surgery

Action Statement

Optimize the patient's medical status before surgery.

Recommendations

1. When possible, every effort should be made to correct controllable factors prior to undertaking surgical amputation, including (see CORE-4: Medical Care):
    a. Cardiovascular
    b. Pulmonary
    c. Metabolic
    d. Nutrition
    e. Psychiatric illness

f. Risk factor reduction (including cardiovascular risk and diabetes mellitus risk reduction)

A-6. Initiate Appropriate Rehabilitation Interventions

Action Statement

Maximize the patient's physical function before surgery.

Recommendation

1. Initiate appropriate rehabilitation interventions while the patient is awaiting amputation surgery, to maintain current function and prevent secondary complications (see CORE-13: Physical Rehabilitation; CORE-14: Functional Rehabilitation).

A-7. Initiate Discharge Planning

Action Statement

Establish a treatment plan for the rehabilitation process.

Recommendation

1. A discharge plan should be initiated early in the pre-operative period and updated throughout the rehabilitation process to address:
    a. Location of rehabilitation
    b. Social support/financial resources
    c. Home environment assessment
    d. Transportation
    e. Vocational considerations
    f. Durable medical equipment (DME)

A-8. Perform Learning Assessment and Provide Patient Education

Action Statement

Pre-procedural patient education should include learning assessment, and a combination of information presentation, and discussing of coping strategies.

Recommendations

1. A learning assessment and identification of barriers to learning or communication should be performed preoperatively.
2. Patients scheduled for amputation should receive education regarding the procedure and the various components of postoperative care and rehabilitation activities, including (see CORE-11: Patient Education):
    a. Pain control
    b. Patient safety/fall precautions
    c. Prevention of complications
    d. Procedural/recovery issues:

- Level of amputation
- Prosthetic options
- Postoperative dressing
- Sequence of amputation care
- Equipment

e. Expectation for functional outcome
f. Potential psychosocial issues
g. Role of the rehabilitation team members

A-9. Arrive at a Shared Decision and Complete the Informed Consent Process

Action Statement

Informed consent must be obtained whenever possible prior to amputation.

Recommendations

1. Based on a clinical evaluation by the treating surgeon with input from the interdisciplinary rehabilitation team, the patient (or person giving consent) should be presented with all viable treatment options and the risks and benefits for the following:
    a. Level of amputation
    b. Management of postoperative wound
    c. Type of postoperative prosthesis

2. The patient (or person giving consent) should be encouraged to ask questions. The surgeon should make every effort to answer those questions to the patient's satisfaction. The patient (or person giving consent) should be able to verbalize a good understanding of their treatment options at the end of the process.
3. Involvement of the patient's family and/or significant others should be encouraged.
4. The patient (or person giving consent) must agree to the surgical and immediate post-surgical treatment plan. The informed consent process should be in compliance with institutional policy (satisfying The Joint Commission's requirements).

A-10. Determine Operative and Postoperative Approaches and Procedures

A-10.1 Determine the Appropriate Level of Surgery

Action Statement

Determine the appropriate level of amputation prior to surgery.

Recommendations

1. The choice of amputation level should take in consideration the risks and benefits. The factors in the risk-benefit assessment include the patient's goals

and priorities, the patient's general condition and risk of additional surgeries, the potential for healing of the limb, and the predicted probable functional outcome.

2. Optimal residual limb length:
    a. Transtibial
        - Optimum – length that allows space for the prosthetic foot and sufficient muscle padding over the residual limb – typically mid-tibia
        - Minimum – junction of middle third and proximal third of tibia just below the flair of the tibial plateau to allow sufficient tibia for weight-bearing.

    b. Transfemoral
        - Optimum – length that allows space for an uncompromised knee system – typically just above the condylar flair
        - Minimum – junction of middle third and proximal third (below the level of the lesser trochanter) to allow sufficient femur length/lever arm to operate the prosthesis.

    c. If there is uncertainty of the optimal length of the residual limb, preoperative consultation with an experienced physiatrist or prosthetist should be considered.

3. The potential for wound healing should be determined. The following may be considered: [**I**]
    a. Laboratory studies:
        - C-reactive protein to check for infection
        - Hemoglobin to check for treatable anemia to ensure an appropriate oxygenation level necessary for wound healing
        - Absolute lymphocyte count to check for immune deficiency and/or infection
        - Serum albumin/prealbumin level to check for malnutrition and diminished ability to heal the wound

    b. Imaging studies:
        - Anteroposterior and lateral radiography of the involved extremity
        - Computed tomography (CT) scanning and magnetic resonance imaging (MRI) as necessary
        - Doppler ultrasonography to measure arterial pressure

    c. Additional tests:
        - Ischemic index (II) is the ratio of Doppler pressure at the level being tested to the brachial systolic pressure – an II of 0.5 or greater at the surgical level is necessary to support healing.
        - Assess preoperative amputation transcutaneous oxygen pressure (TcPO2) levels – preoperative levels greater than 20 mmHg are associated with successful healing after amputation. [**A**]

A-10.2 Determine Postoperative Dressing

Action Statement

An appropriate postoperative dressing should be selected by the surgeon in the preoperative phase to protect the residual limb, decrease edema, and facilitate wound healing; consider the use of a rigid postoperative dressing.

Recommendations

1. The appropriate postoperative dressing should be determined by the surgeon before surgery, recognizing that circumstances occurring during the surgery may necessitate changes. [**I**]
2. Consider the use of a rigid or semi rigid dressing to shorten the time to healing and readiness for prosthesis in dysvascular transtibial amputations. [**B**]
3. There is inconclusive evidence to recommend for or against a specific kind of rigid dressing. [**I**]
4. Properly fitted shrinkers should be used as soon as possible, after amputation. [**I**]
5. Patients with a bulbous transtibial limb are more likely to do better with a rigid dressing applied above the knee and changed every three to five days until they are able to tolerate a shrinker. [**I**]

A-11. Perform Amputation Reconstructive Surgery

A-11.1 Adhere to Surgical Principles

Action Statement

Consider the implications of the surgical reconstructive procedure on the patient's rehabilitation and the potential for prosthetic use.

Recommendation

1. Perform the appropriate amputation at the selected level, adhering to good surgical and amputation principles.

A-11.2 Utilize Effective Postoperative Dressing

Action Statement

Apply the postoperative dressing of choice to protect the residual limb, decrease edema, and facilitate wound healing; especially consider the use of a rigid postoperative dressing.

Recommendations

1. Appropriate postoperative dressing should be applied after amputation.
2. The use of rigid postoperative dressings should be considered (which is preferred in situations where limb protection is the priority). [**B**}

Module B: Immediate Postoperative Rehabilitation

Immediate Postoperative Rehabilitation Algorithm

B-2. Determine the Postoperative Care Plan

Action Statement

A plan of postoperative care should be determined before the operation by the surgeon and the rehabilitation team based on the interdisciplinary preoperative evaluation.

Recommendations

1. The postoperative plan should include a care plan to address:
    a. Medical requirements
    b. Wound or surgical requirements
    c. Rehabilitation requirements including:
        - Prevent contractures
        - Reduce postoperative edema through the use of compression therapies
        - Protect the amputated limb from external trauma
        - Ensure patient safety

B-3. Provide Appropriate Wound Care and Residual Limb Management

Action Statement

The appropriate postoperative wound care and residual limb management should be prescribed by the surgeon performing the operation.

Recommendations

1. For a closed amputation and primary closure, the following procedures should be performed:
    a. May apply sterile, non-adherent dressing secured with stockinet.
    b. Apply a compressive dressing to reduce edema and shape the residual limb.
    c. Monitor for infection.
    d. Remove the sutures or staples per the advice of the surgeon.

2. For an open amputation, the following procedures should be considered:
    a. Staged closure at a later date may be required for wounds heavily contaminated from infection or trauma
    b. A vacuum-assisted-closure devise may be helpful for open wounds

3. Residual limb management should continue with the focus on postoperative dressings, control of the edema and shaping of the residual limb, control of the pain, and protection of the residual limb from further injury.

    (See CORE-6: Residual Limb)

B-4. Provide Acute Postoperative Management

Action Statement

Specific medical and surgical interventions need to be initiated immediately in the postoperative phase. Combat casualties with polytrauma may be best treated in a designated polytrauma center.

Recommendations

1. A thorough medical assessment should be completed postoperatively to assess physical condition, nutrition, lack of infection, and bowel and bladder function as well as a review of systems (cardiovascular, respiratory, endocrine, skin, neurological, and musculoskeletal).
2. Treatment of pain should be started immediately and address the specific source of pain:
    a. Post surgical pain – appropriate edema control, liberal use of narcotics
    b. Neuropathic/phantom pain –consider use of anticonvulsant (e.g., pregabalin, gabapentin), antidepressants (e.g., selective serotonin reuptake inhibitors [SSRIs], or tricyclic antidepressants [TCAs])
    c. Consider use of epidural or regional anesthesia
3. Specific measures for deep vein thrombosis (DVT) and pulmonary embolism (PE) prophylaxis should be applied.
4. A nutrition assessment should be documented and specific recommendations should be applied; referral to a nutrition specialist should be considered.
5. A thorough sepsis workup for any signs/symptoms of systemic infection should be completed.
6. Medical and surgical comorbidities resulting from polytrauma, such as that seen in combat casualties, are best managed in rehabilitation centers that provide interdisciplinary management including multiple medical and surgical subspecialties with trauma experience.
7. Bowel and bladder functions should be monitored to maintain fluid balance as well as to avoid urinary retention and constipation, which may be brought on by medications (particularly opioids and anticholinergics) and/or decreased mobility.
8. Behavioral health support should be provided as necessary.
9. The following rehabilitation interventions should be initiated as tolerated:
    a. Range of motion (ROM)
    b. Strengthening
    c. Cardiovascular fitness and endurance
    d. Balance
    e. Mobility
    f. Functional activities and ADL
10. Patient and family education on positioning, skin care, and pain management; preservation of the intact limb; and approaches to modify risk factors should be re-enforced from preoperative training.

    (See CORE-13: Physical Rehabilitation and CORE-14: Functional Rehabilitation)

B-5 Problems with Wound Healing?

Action Statement

Assess the wound status using a standardized approach and provide intervention accordingly.

Recommendations

1. Patients undergoing lower limb amputations should be assessed using a standardized approach like the one described in the table below. The depth and extent of involvement of the non-healing and nonviable skin, subcutaneous tissues, muscle, and/or bone will assist in the evaluation and treatment of problematic wounds.

Table: Categories of Wound Healing*	
Category I:	*Primary*; heal without open areas, infections, or wound complications; no wound healing intervention required.
Category II:	*Secondary*; small open areas that can be managed and ultimately healed with dressing strategies and wound care. Additional surgery is not required. May be possible to stay with the original plan with some portion of the wound intentionally left open.
Category III:	Skin and subcutaneous tissue involvement (no muscle or bone involvement); requires minor surgical revision.
Category IV:	Muscle or bone involvement; requires major surgical revision but heals at the initial amputation "level."
Category V:	Requires revision to a higher amputation level; for example, a transtibial amputation that must be revised to either a knee disarticulation or a transfemoral amputation.

*Adapted from Smith D. (Co-chair). Clinical Standards of Practice (CSOP) consensus conference: assessing outcomes and the future. *JPO* 2004, Vol 16, Num 3S. Available from: http://www.oandp.org/jpo/library/index/2004_03S.asp.

B-6. Consider Additional Interventions for Postoperative Wound Management as Needed

Recommendations

1. Early revision surgery may be considered for wounds that are slow to heal, particularly in Category III, IV, and V wounds.
2. Early vascular evaluation may be considered for patients with delayed healing and consultation for vascular intervention may be considered for patients with impaired peripheral arterial blood flow.
3. Early evaluation and treatment for potential superficial and deep infections may be considered for patients with delayed healing. The evaluation may include wound cultures, laboratory studies, and radiological studies. Debridement, intravenous antibiotics, and/or revision may be necessary to achieve infection control.
4. Early aggressive local wound care should always be initiated for any degree of wound breakdown. This may include the use of topical agents (Regranex, Aquacel Silver, Panafil).

5. Hyperbaric oxygen can be considered as an adjunct treatment for impaired wound healing.

B-7. Is the Patient Medically Stable to Be Discharged from Acute Care?

Recommendations

1. Medical status should be assessed prior to proceeding to another level of care. The following criteria must be met prior to discharge to the next level of care:
    a. Hemodynamically stable
    b. Lack of systemic infection or an appropriate course of treatment in place
    c. Stable surgical site
    d. Acceptable bowel and bladder management
    e. Comorbid conditions addressed

B-8. Determine the Optimal Rehabilitation Environment and Update the Treatment Plan

Action Statement

Determine the level of rehabilitation to be performed after discharge from the acute care setting.

Update the treatment plan to reflect the level of rehabilitation and the patient's disposition.

Recommendations

1. Rehabilitative placement following a lower limb amputation should be based on the patient's medical status, current and anticipated function, ability to participate in rehabilitation interventions, social support system, and community resources.
2. To be discharged from acute care the patient's medical condition needs to be stable.
3. Patients are able to be discharged to home when:
    - Medically stable
    - Able to be mobile and transfer with available social support systems utilizing appropriate assistive devices (walker, cane, wheelchair)
    - Able to perform basic daily living skills independently or have a social support system to compensate for the deficiencies
    - There is an accessible home environment.
    - There is access to continued rehabilitation interventions as needed.

4. Patient who do not meet criteria for discharge to home may be referred to:
    a. Acute inpatient rehabilitation care when:
        - Able to follow a minimum of two-steps commands
        - Able to actively participate and benefit from at least two hours of therapy per day

    b. Sub-acute rehabilitation care or an extended nursing facility when:

- Able to follow single step commands
- Able to actively participate in less than two hours of therapy per day

5. Patients not meeting the criteria for discharge to a rehabilitation program (e.g., they do not meet the above cited criteria and nursing care outweighs rehabilitation care) may be discharged to a program that is primarily focused on skilled nursing care when:
    a. Medically stable
    b. Able to tolerate only a few hours of therapy per week

Module C: Immediate Postoperative Rehabilitation

Pre-prosthetic Rehabilitation Algorithm

C-2. Postoperative Assessment

Action Statement

Obtain a comprehensive multidisciplinary assessment of the patient's postoperative status.

Recommendations

1. A thorough medical assessment should be completed upon admission to rehabilitation to include cardiovascular, pulmonary, endocrine, neurological, bowel and bladder, skin, and musculoskeletal.
2. Special attention should be taken to assess the health of the contralateral leg and foot including vascular health, sensation, presence of deformity, abnormal skin or other tissue, and appropriate footwear.
3. Assess the healing of the wound by monitoring:
    a. Wound closure
    b. Drainage or seepage
    c. Excessive redness or induration around the wound site
    d. Temperature of the surrounding tissue

4. Involve the surgeon in problems with wound healing and wound management regardless of the patient's disposition
5. Consult the specialized wound care team as needed.
6. Protect the residual limb from external trauma to reduce potential complications, delayed wound healing and encourage mobility.
7. Residual limb management should continue with the focus on control of edema, shaping the residual limb and control of the pain. (See CORE-6: The Residual Limb)
8. Postoperative physical and functional assessment should be performed after amputation surgery and prior to postoperative rehabilitation. Include the following:
    a. Patient history, including
        - Past medical history
        - Home environment
        - Premorbid functional level – ADL, mobility, and cognition

- Social environment (see Core-9: Social Environment [Support])

b. Physical assessment, including:
   - Range of motion (ROM) – bilateral hips, knees, and upper extremities
   - Strength – upper extremities and lower extremities
   - Sensation – involved limb and contralateral limb
   - Proprioception – involved limb and contralateral limb
   - Balance – sitting and standing

c. Functional assessment including:
   - Mobility – current level of function and use of assistive devices (bed, transfers, ambulation)
   - Basic ADLs – eating, grooming, toileting, bathing, and dressing

d. Screen for other impairments (e.g., vision and hearing, or other trauma)

9. Consider using standardized measures at admission and discharge to demonstrate progress and the efficacy of the rehabilitation process. The recommended tools for assessment include:
   a. Amputee Mobility Predictor (AMP)
   b. Functional Independence Measure (FIM)
   c. Two-Minute Walk
   d. Timed Up and Go Test (TUG)
   e. Upper Extremity Ergometry

   (See CORE-14.2: Mobility and Equipment)

10. Pain assessment should be performed by all members of the rehabilitation team.
11. Patients should be assessed for pain and treatment should be based on etiology and initiated/continued to optimize rehabilitation.
12. Consider prophylactic pain management prior to the rehabilitation session. (See CORE-3: Pain Management)
13. A psychological assessment should be completed if not done preoperatively.
14. Continuous monitoring of behavioral health should be performed by all members of the rehabilitation team. (See CORE-8: Behavioral Health Assessment and Treatment)
15. A postoperative cognitive/neuropsychological assessment should be conducted if not completed preoperatively. (See CORE-5: Cognitive Assessment)

C-3 Determine Rehabilitation Goals

Action Statement

Establish rehabilitation goals at the beginning of the rehabilitation process involving members of the rehabilitation team and the patient, to guide the treatment.

Recommendations

1. Members of the rehabilitation team should work with the patient to establish goals specific to their area of expertise.
2. Goals should be written, be measurable, and be specific.

C-4. Provide Treatment as Needed to Optimize the Patient's Medical Condition(s) for Rehabilitation

Action Statement

Optimize medical status before, as well as during, pre-prosthetic rehabilitation.

Recommendations

1. The following conditions, if present, require aggressive management:
    a. Hyperglycemia
    b. Cardiac, respiratory, renal, and metabolic
    c. Nutritional deficiency
    d. Major psychiatric illness
    e. Vascular lesions

    (See CORE-4: Medical Care)

C-5. Provide Patient Education

Action Statement

Provide in-depth patient education regarding the various components of postoperative care and anticipated rehabilitation activities.

Recommendations

1. During the pre-prosthetic rehabilitation phase the following should be covered with the patient:
    a. Positioning
    b. Rehabilitation process
    c. Pain control
    d. Residual limb care
    e. Prosthetic timeline
    f. Equipment needs
    g. Coping methods
    h. Prevention of complications
    i. Safety and fall prevention (essential)

    (See CORE-11: Patient Education)

C-6. Establish/Update the Rehabilitation Treatment Plan

Action Statement

Update the rehabilitation treatment plan to reflect the patient's progress, goals, and needs.

Recommendations

1. Rehabilitation goals should be documented in the treatment plan.
2. The treatment plan should be updated by the rehabilitation team to reflect changes in the patient's status.

   (See CORE-2: Rehabilitation Treatment Plan)

C-7. Provide Physical and Functional Intervention Based on Current and Potential Function

Action Statement

Initiate, assess, and adjust the rehabilitation interventions to improve the patient's physical and functional status.

Recommendations

1. Provide physical and functional rehabilitation interventions in the following:
   a. Residual limb management (teach care of the residual limb and the use of ACE wrap and shrinkers)
   b. Range of motion (ROM) (residual and contralateral limbs at the hip and knee)
   c. Strengthening (add trunk and core stabilization exercises; initiate a home exercise program)
   d. Cardiovascular endurance (tailored to patient's fitness level and progressed as tolerated)
   e. Balance (progress program to dynamic balance training)

   (See CORE-13: Physical Rehabilitation and CORE-14: Functional Rehabilitation)

2. Provide interventions to evaluate and promote community reintegration:
   a. Home evaluation and modification
   b. Mobility (progress single limb gait from the parallel bars to the use of an appropriate assistive device)
   c. Equipment (independent wheelchair mobility)
   d. Functional activities and ADL
   e. Driver's training and vehicle adaptation
   f. Vocational rehabilitation or return to school
   g. Recreation activities without a prosthesis

   (See CORE-14: Functional Rehabilitation)

C-8. Is a Prosthesis Appropriate to Improve Functional Status and Meet Realistic Patient Goals?

Action Statement

Determine if the patient is a candidate for a prosthesis.

Recommendations

1. Patient's candidacy for a prosthesis should be determined by the rehabilitation team based on the patient's characteristics, goals, and an objective evaluation of their functional status. Some areas to be considered:
    a. Patient is willing and motivated to move forward for prosthetic rehabilitation.
    b. Patient has the ability to understand and apply knowledge to the fitting and use of a prosthesis.
    c. Contralateral limb will tolerate weight bearing.
    d. Patient is in adequate physical condition to tolerate walking with a prosthesis.
    e. Prosthesis contributes to quality of life or self image

C-9. Prescribe Appropriate Durable Medical Equipment (DME)

Action Statement

Provide durable medical equipment (DME) prescription (e.g., wheelchair, walker, crutches, shower chairs).

Recommendations

1. Additional equipment to facilitate mobility and ADL is required for a patient with a lower extremity amputation.
2. The type of equipment should be based on the current and anticipated functional status.

Module D: Prosthetic Training

Prosthetic Training Algorithm

D-1. Determine Functional Goals of Prosthetic Fitting

Table: Centers for Medicare and Medicaid Services Functional Levels	
Level of Function	**Description of Ambulation Level**
K 0:	The patient does not have the ability or potential to ambulate or transfer safely with or without assistance and the prosthesis does not enhance his/her quality of life or mobility.
K 1:	The patient has the ability or potential to use the prosthesis for transfers or ambulation on level surfaces at fixed cadence - typical of the limited and unlimited household ambulator.
K 2:	The patient has the ability or potential for ambulation with the ability to traverse low-level environmental barriers such as curbs, stairs, or uneven surfaces - typical of the limited community ambulator.
K 3:	The patient has the ability or potential for ambulation with variable cadence - typical of the community ambulator who has the ability to

Table: Centers for Medicare and Medicaid Services Functional Levels	
Level of Function	**Description of Ambulation Level**
	traverse most environmental barriers and may have vocational, therapeutic, or exercise activity that demands prosthetic utilization beyond simple locomotion.
K 4:	The patient has the ability or potential for prosthetic ambulation that exceeds basic ambulation skills, exhibiting high impact, stress, or energy levels - typical of the prosthetic demands of the child, active adult, or athlete.

Action Statement

Determine current and prospective functional needs of the patient.

Recommendations

1. Patients at K level "0" are not recommended for prostheses for ambulation or transfers.
2. Patients a K level "1" are recommended for prostheses that meet the functional goals of limited and unlimited household ambulation.
3. Patients at K level "2" are recommended for prostheses that meet the functional goals of limited community ambulation.
4. Patients at K level "3" are recommended for prostheses as community ambulators with the ability to traverse most environmental barriers and may have vocational, therapeutic, or exercise activity that demands prosthetic utilization beyond simple locomotion.
5. Patients at K level "4" are recommended for prostheses at the highest level of functioning typical of the child, active adult, or athlete.
6. Prosthetic fittings typically should not begin until the suture line has completely healed, although in unusual circumstances prosthetic fitting and limited ambulation may start with a clean non-infected wound with granulation tissue.

D-2. Prescribe the Prosthesis Based on the Current or Potential Level of Ambulation

1. The prescription for a patient with a transmetatarsal amputation should include:
    a. Toe filler/arch support
    b. Custom/prefabricated ankle-foot orthosis (AFO) with toe filler
    c. Assessment for adequate shoe fit

2. The prescription for a patient with a transtibial/transfemoral amputation should include:
    a. Socket
    b. Socket interface
    c. Suspension mechanism
    d. Pylon
    e. Knee joint
    f. Foot/ankle

(See Appendix C of the original guideline document for a listing of specifications.)

D-3. Perform Basic Prosthetic Fitting and Early Rehabilitation Management

Action Statement

Fabricate, dynamically align, adjust, and modify the prosthesis, and instruct the patient on the use of a prosthesis when appropriate.

Recommendations

1. Initiate physical and functional interventions for prosthetic training as appropriate for the patient's functional goals:
    a. Residual limb management (donning and doffing of prosthesis, gel liners, or socks as appropriate)
    b. Range of motion (ROM)
    c. Strengthening
    d. Cardiovascular fitness and endurance
    e. Balance
    f. Mobility
    g. Functional activities and ADL
    h. Equipment
    i. Driver's training
    j. Home evaluation
    k. Home exercise program
    l. Community integration

2. A two-phase process may be considered for prosthetic fitting and training:
    a. Phase One: Preparatory (preliminary) prosthesis
    b. Phase Two: Definitive prosthesis
    c. If only a definitive prosthetic is to be fitted, the fitting for the socket should be delayed until the residual limb is fully mature (usually three to four months) or until general stabilization occurs in the patient's weight and residual limb volume.

D-4. Provide Prosthetic Gait Training

Action Statement

Prosthetic gait training must be performed for the patient to safely ambulate on all surfaces with or without adaptive equipment.

Recommendations

1. Once basic prosthetic management has been completed, the focus should move to weight bearing with the prosthesis, standing balance, weight shifts, and equalization of step length.

2. Once the patient has mastered prosthetic ambulation with a walker or other assistive device, training on stairs, uneven surfaces, and ramps/inclines are recommended.
3. Prosthetic gait training should incorporate aspects related to the patient's home, work, and/or recreational environments.

D-5. Provide Education on Functional Use of the Prosthesis for Transfers, Balance, and Safety

Action Statement

Provide training to help the non-ambulatory patient maximize their independence in transfers with the prosthesis.

Recommendations

1. Initial patient education in the use of a prosthetic lower limb should include:
    a. Demonstration and training in donning and doffing the prosthesis (dependent upon the type of prosthesis provided)
    b. Initial training in how to start ambulation (dependent upon the type of prosthesis provided)
    c. Instruction in accomplishing safe transfers taking in consideration the home environment
    d. Instruction in how to fall safely and get back up
    e. Instruction in daily self inspections of the residual limb for excessive tissue loading; if erythema is present upon removing the prosthesis and does not completely resolve in 20 minutes, the patient should be instructed to report it immediately
    f. Basic residual limb and prosthetic hygiene

2. If appropriate, the patient's caregiver should also be instructed in management and care of the prosthesis, proper transfer technique and safety.

D-6. Monitor and Reassess Functional and Safe Use of the Prosthesis; Optimize Components and Training

Action Statement

Continue to assess functional and safe use of the prosthesis and optimize the components and training at least throughout the first year post fitting.

Recommendations

1. Patients who were not prosthetic candidates or candidates for a transfer prosthesis should be evaluated periodically to determine if their functional goals may be expanded to include ambulation.
2. Patients with a prosthesis should be advised to report any of the following symptoms as they are signs that the prosthesis needs to be modified:
    a. Ongoing pain
    b. Skin breakdown

c. Change in the ability to don and doff the prosthesis
d. Change in the number of sock plies
e. Change in the pattern of usage
f. Change in functional needs or goals

3. The prosthesis should be assessed at least once within the first year of prosthetic use to address:
    a. Stability
    b. Ease of movement
    c. Energy efficiency
    d. Appearance of the gait to determine the success of fitting and training

4. Patients presenting with dermatologic problems require assessment and intervention:
    a. Contact dermatitis: assess the hygiene of the liner, socks, and suspension mechanism
    b. Cysts and sweating: assess for excessive shear forces and improperly fitted components
    c. Scar management: requires massaging and lubricating the scar to obtain a well-healed result without dog ears or adhesions
    d. Superficial fungal infections are common and will require topical anti-fungal agents for resolution

D-7. Prescribe Appropriate Durable Medical Equipment (DME) and Training

Action Statement

Consider DME prescription (e.g., wheelchair, walker, cane, crutches, shower chairs).

Recommendations

1. Additional equipment to facilitate mobility and ADL should be provided after lower extremity amputation with or without a prosthesis.
2. The type of equipment should be based on the current and anticipated functional status.

Module E: Immediate Postoperative Rehabilitation

Rehabilitation and Prosthesis Follow-Up Algorithm

E-2. Schedule At Least One Follow-Up Appointment Within the First Year after Discharge From Rehabilitation and Prosthetic Training

Action Statement

All patients with amputations should have at least one scheduled follow-up appointment, within the first year after discharge, to evaluate the quality and comfort of the prosthetic fit and the patient's health status and function.

Recommendations

1. Patients with a prosthesis should visit the Amputation Clinic Team for an initial comprehensive visit to address any change in the condition of the residual limb.
2. Patients with minor repairs or adjustments to the prosthesis should visit a prosthetic laboratory.
3. Patients with a change in their medical condition should be seen by a primary care provider or physiatrist, in addition to their comprehensive follow-up with the Amputation Clinic Team.
4. A follow-up appointment should be made at the time of the comprehensive visit with the appropriate clinic or provided at the patient's request, after a major medical or functional change, or after a referral/consultation is received.
5. Patients with a lower limb amputation who are not prosthetic users should be seen by their primary care provider to manage comorbidities, evaluate medical risks, and maintain the health of the residual and contralateral extremity.
6. If the function of a non-prosthetic user changes and he/she becomes a prosthetic candidate, an appointment should be made with the Amputation Clinic Team for consideration of prosthetic restoration.

E-3. Provide Follow-Up Assessment and Treatment

Action Statement

The long-term follow-up should include assessment of the patient's goals, function, secondary complications, and the condition of the prosthesis. Treatment should also be provided as indicated.

Recommendations

1. The follow-up assessment for a prosthetic user should include:
    a. Patient's goals (i.e., new recreation, vocation, or community requirements)
    b. Functional assessment:
        - Gait and mobility
        - Residual limb health
        - Contralateral limb
        - Socket fit or residual limb volume
        - Strength and ROM
        - Changing needs for DME
        - ADL

    c. Secondary complications as a result of prosthetic use:
        - Pain control
        - Skin integrity
        - Associated musculoskeletal conditions (e.g., back pain and knee pain)

    d. Prosthetic assessment (repair, replacement, mechanical adjustment, new technology)

e. Vocational and recreational needs

2. The follow-up assessment for a non-prosthetic user should include:
    a. Patient's goals
    b. Functional assessment
        - Residual limb health
        - ROM
        - Strength
        - Gait and mobility
        - Changing needs for DME
        - ADL

    c. Secondary complications in the residual and contralateral limb:
        - Pain control
        - Skin integrity
        - Associated musculoskeletal conditions (e.g., back and knee pain)

    d. Vocational and recreational needs

E-4. Provide Secondary Amputation Prevention

Action Statement

Identify high-risk patients and provide patient education to minimize the potential for secondary amputation.

Recommendations

1. Long-term follow-up should include an assessment and management of risk factors for secondary amputation including peripheral vascular disease, diabetes, peripheral neuropathy or nerve injury, skin integrity, foreign bodies, bony deformities including heterotopic ossification, and a history of foot ulcers.
2. For the patient with vascular disease or diabetes, long-term follow-up should include appropriate foot care and patient education at every patient visit (see the VA/DoD Clinical Practice Guideline for Diabetes Mellitus - Module F: Foot Care [available at the Department of Veterans Affairs Web site]).
3. Patients identified to be at risk for limb-loss should be referred to an appropriate specialist.
4. Encourage cardiovascular fitness to compensate for the increased metabolic cost of ambulation post-amputation.
5. Provide patient and family education regarding risk-modification to encourage a healthy lifestyle through increased exercise, improved nutrition, and smoking cessation (see Appendix D, Foot Care Interventions for Patients with Amputation, in the original guideline document).

E-5. Continue Follow-Up as Needed

Action Statement

A patient with a lower limb amputation should receive life-long care to maintain the quality and functionality of the prosthetic limb and the patient's abilities, goals, and quality of life.

Recommendations

1. Intermittent/regular follow-up should be provided to assess the patient's current needs, abilities, and goals.
2. Life-long care should include monitoring the patient for psychosocial adjustment, skin disorders of the residual limb, pain, musculoskeletal impairments, cardiovascular disease, other chronic diseases, and the health of the contralateral limb and provision of appropriate foot wear for the contralateral foot.
3. A follow-up appointment should also be provided at the patient's request, after a major medical or functional change, or after a referral/consultation is received.
4. For the prosthetic user, life-long care should also include surveillance for and management of secondary impairments associated with limb-loss; i.e., cardiovascular disease, accelerated degenerative joint disease of other joints, functional losses due to aging, and complications of prosthetic use.
5. For the prosthetic user, new technology should be considered but must be matched to the patient's function and goals, and followed with an additional period of gait training to help the patient learn to use new components. The latest technology is not always the best choice for the patient.

Definitions:

Evidence Rating System

Quality of Evidence (QE)

I	At least one properly done randomized controlled trial (RCT)
II-1	Well designed controlled trail without randomization
II-2	Well designed cohort or case-control analytic study, preferably from more than one source
II-3	Multiple time series evidence with/without intervention, dramatic results of uncontrolled experiment
III	Opinion of respected authorities, descriptive studies, case reports, and expert committees

Overall Quality

Good	High grade evidence (I or II-1) directly linked to health outcome
Fair	High grade evidence (I or II-1) linked to intermediate outcome; *or* Moderate grade evidence (II-2 or II-3) directly linked to health outcome
Poor	Level III evidence or no linkage of evidence to health outcome

Net Effect of the Intervention

Substantial:	More than a small relative impact on a frequent condition with a substantial burden of suffering; *or* A large impact on an infrequent condition with a significant impact on the individual patient level.
Moderate:	A small relative impact on a frequent condition with a substantial burden of suffering; *or* A moderate impact on an infrequent condition with a significant impact on the individual patient level.
Small:	A negligible relative impact on a frequent condition with a substantial burden of suffering; *or* A small impact on an infrequent condition with a significant impact on the individual patient level.
Zero or Negative:	Negative impact on patients; *or* No relative impact on either a frequent condition with a substantial burden of suffering, *or* an infrequent condition with a significant impact on the individual patient level.

Strength of the Recommendations

	Net Benefit of the Intervention			
Quality of Evidence	**Substantial**	**Moderate**	**Small**	**Zero or Negative**
Good	A	B	C	D
Fair	B	B	C	D
Poor	I	I	I	I

Strength of Recommendation Rating System	
A	A strong recommendation that the clinicians provide the intervention to eligible patients. *Good evidence was found that the intervention improves important health outcomes and concludes that benefits substantially outweigh harm.*
B	A recommendation that clinicians provide (the service) to eligible patients. *At least fair evidence was found that the intervention improves health outcomes and concludes that benefits outweigh harm.*
C	No recommendation for or against the routine provision of the intervention is made. *At least fair evidence was found that the intervention can improve health outcomes, but concludes that the balance of benefits and harms is too close to justify a*

Strength of Recommendation Rating System	
	general recommendation.
D	Recommendation is made against routinely providing the intervention to asymptomatic patients. *At least fair evidence was found that the intervention is ineffective or that harms outweigh benefits.*
I	The conclusion is that the evidence is insufficient to recommend for or against routinely providing the intervention. *Evidence that the intervention is effective is lacking, or poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

Abbreviations and Acronyms List

ADL - Activities of Daily Living

AFO - Ankle-Foot Orthosis

AMP - Amputee Mobility Predictor

DME - Durable Medical Equipment

DVT - Deep Vein Thrombosis

FIM - Functional Independence Measure

HAD - Hospital Anxiety and Depression Scale

HBO – Hyperbaric Oxygen Therapy

HO - Heterotopic Ossification

IPOP – Immediate Postoperative Prosthesis

LBP - Low Back Pain

NSAID - Non-Steroidal Anti-Inflammatory Drugs

NWB - Non-Weight Bearing

PCA - Patient Controlled Analgesia

PE - Pulmonary Embolism

PEQ - Prosthesis Evaluation Questionnaire

PIS - Pain Interference Scale

PLP - Phantom Limb Pain

PTSD - Post-Traumatic Stress Disorder

RCT - Randomized Controlled Trial

RLP - Residual Limb Pain

ROM - Range of Motion

RRD - Rigid Removable Dressing

SF-MPQ - Short Form McGill Pain Questionnaire

SSRI - Selective Serotonin Re-uptake Inhibitors

TCA - Tricyclic Antidepressants

TENS - Transcutaneous Electrical Nerve Stimulation

TUG - Timed Up and Go Test

VAS - Visual Analog Scale

CLINICAL ALGORITHM(S)

The following clinical algorithms are provided in the original guideline document:

- Module A: Preoperative Assessment and Management
- Module B: Immediate Postoperative Rehabilitation
- Module C: Pre-Prosthetic Rehabilitation
- Module D: Prosthetic Training
- Module E: Rehabilitation and Prosthesis Follow-Up

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The guideline is supported by the literature in a majority of areas, with evidence-based tables and references through the document. The evidence consists of key clinical randomized controlled trials and longitudinal studies in the area of rehabilitation of amputation. Where existing literature is ambiguous or conflicting, or where scientific data are lacking on an issue, recommendations are based on the expert panel's opinion and clinical experience. The guideline contains a bibliography and discussion of the evidence supporting each recommendation.

The quality of the evidence supporting individual recommendations is given for selected recommendations (see "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

The overall goal of amputation rehabilitation is to optimize health status, function, independence, and quality of life of patients with a lower limb amputation.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- The Department of Veterans Affairs (VA) and The Department of Defense (DoD) guidelines are based upon the best information available at the time of publication. They are designed to provide information and assist decision-making. They are not intended to define a standard of care and should not be construed as one. Neither should they be interpreted as prescribing an exclusive course of management.
- Variations in practice will inevitably and appropriately occur when providers take into account the needs, abilities, and motivations of individual patients, available resources, and limitations unique to an institution or type of practice. Every healthcare professional making use of these guidelines is responsible for evaluating the appropriateness of applying them in the setting of any particular clinical situation.
- Clinical practice guidelines, which are increasingly being used in health care, are seen by many as potential solutions to inefficiency and inappropriate variations in care. Guidelines should be evidenced-based as well as based upon explicit criteria to ensure consensus regarding their internal validity. However, it must be remembered that the use of guidelines must always be in the context of a health care provider's clinical judgment in the care of a particular patient. For that reason, the guidelines may be viewed as an

educational tool analogous to textbooks and journals, but in a more user-friendly format.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

Implementation

The guideline and algorithms are designed to be adapted to individual facility needs and resources. It is expected that this guideline will provide information useful for improving amputation care by reducing variability. Providers may use the algorithms to determine best interventions and steps of care for their patients to optimize healthcare utilization and achieve the best outcomes related to rehabilitation following lower limb amputation. This should not prevent providers from using their own clinical expertise in the care of an individual patient. Guideline recommendations should facilitate, not replace, clinical judgment.

This guideline represents a first attempt in providing a structure for a rehabilitation process in lower limb amputation that is evidence-based. As rehabilitation practice is evolving, new technology and more research will improve rehabilitation care in the future. The clinical practice guideline can assist in identifying priorities for research efforts and allocation of resources. As a result of implementing a more unified approach to rehabilitation practice, followed by data collection and assessment, new practice-based evidence may emerge.

IMPLEMENTATION TOOLS

Clinical Algorithm
Quick Reference Guides/Physician Guides
Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for rehabilitation of lower amputation. Washington (DC): Department of Veterans Affairs, Department of Defense; 2007. 163 p. [71 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

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GUIDELINE DEVELOPER(S)

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available from the Department of Veterans Affairs Web site.

Print copies: Available from the Department of Veterans Affairs, Veterans Health Administration, Office of Quality and Performance (10Q) 810 Vermont Ave. NW, Washington, DC 20420.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- VA/DoD clinical practice guideline for management for rehabilitation of lower limb amputation. Guideline summary. Washington (DC): Department of Veterans Affairs (U.S.); 2007. 55 p. Electronic copies: Available from the Department of Veterans Affairs Web site.
- Guideline for Guidelines. Draft. Washington (DC): Veterans Health Administration, Department of Veterans Affairs. Available at: VHA Web site.
- Putting clinical practice guidelines to work [online tutorial]. Available from the Department of Veterans Affairs Web site.

PATIENT RESOURCES

None available

NGC STATUS

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